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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/533,368

07/18/2005

Gregory D. Len

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12/01/2009

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EXAMINER

YANCHUK, STEPHEN J

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

12/01/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/533,368	<b>Applicant(s)</b> LEN ET AL.	
	<b>Examiner</b> STEPHEN YANCHUK	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 August 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 10-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## METHOD AND SYSTEM FOR CONTROLLING FLUID FLOW IN A FUEL PROCESSING SYSTEM

Examiner: S. Yanchuk SN: 10/533368 Art: 1795 November 27, 2009

### Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 10-22 & 25 are rejected under 35 U.S.C. 102(a) as being anticipated by Okamoto (PGPUB 2002/0182465).

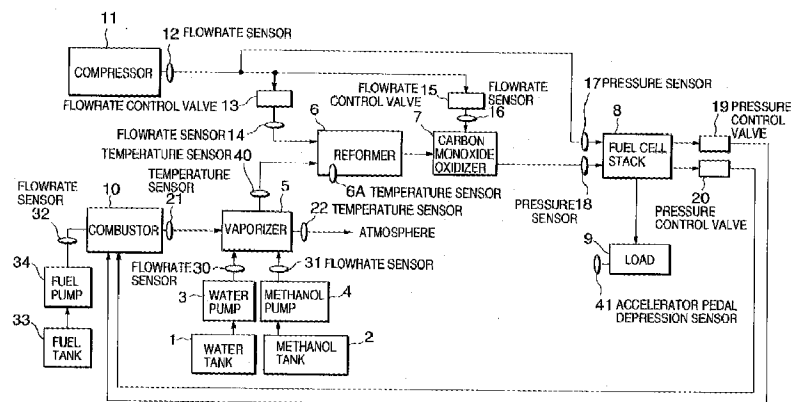


FIG. 1

Okamoto Figure 1

Okamoto teaches a fuel cell stack vaporizer with control method as shown in figure 1. The fuel reformer (6) comprises a sensor and control valve (14, 13); The cleanup unit comprises a sensor and controller (16, 15); The fluid conduit to the fuel cell

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has a pressure sensor (17) [Figure 1]. The air amount to the reformer is determined based on the detection temperature of the temperature sensor (6A) [Paragraph 35]. The third sensor and controller is controlled by the electric power generated and accelerator depression [Paragraph 37-39]. The control system as described by Okamoto is able to perform the same task as the claimed invention. The claim limitation to "sensor...not a fluid flow rate sensor" does not limit the structure to omit a fluid rate sensor, only that the controller must factor in another input from a non-flow rate sensor before making adjustments; the prior art teaches such sensors and control mechanisms [Figure 1, Paragraph 33-39]. The system is capable of having a flow volume that is less than about 10% of the average flow volume of the first fluid streams during the operation of the fuel cell system.

Claim 11: Okamoto teaches element 14.

Claim 12: Okamoto teaches air passes through this line [Figure 1, Paragraph 33-39].

Claim 13, 16: Okamoto teaches control of the compressor [Paragraph 32].

Claim 14: Okamoto teaches a control valve and connecting pipe to all elements as depicted in figure 1.

Claim 17: Okamoto teaches control valves for the second fluid stream (15).

Claim 19-22: Okamoto teaches a fuel reform process involving the elements of Figure 1 (10, 5, 6, 7) wherein the applicant has claimed equivalents known in the art. The control structure submitted by the applicant and control structure would be the same for those systems and therefore the claims are rejected.

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Claim 23: The processor unit comprises water (3).

Claim 24: The processor unit comprises fuel (33).

Claim 25: The compressor would be comprise a pump (11).

Claim 26: The air amount to the reformer is determined based on the detection temperature of the temperature sensor (6A) [Paragraph 35] and a flowrate sensor (14).

Claim 27: An air flowrate sensor is taught (16).

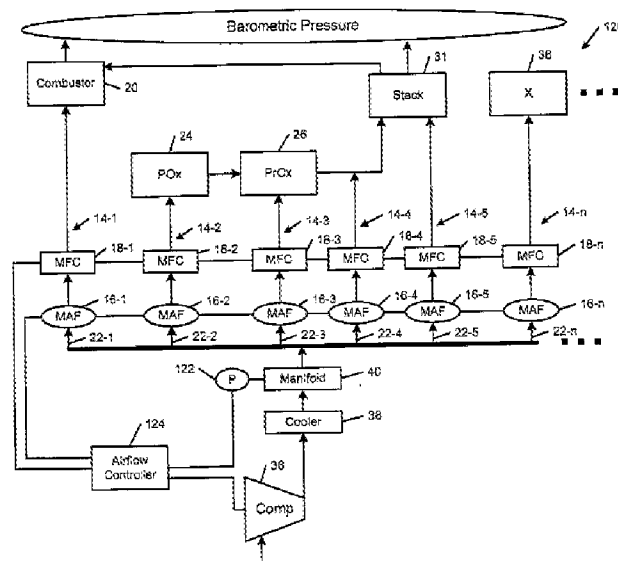
Claim 28: The third sensor comprises a sensor that monitors the electricity production rate or demand [Paragraph 38-39].

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 10-14, 16-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kelskula et al (PGPUB 2003/0186096) and further in view of Okamoto (PGPUB 2002/0182465).



Keskula Figure 3

Kelskula teaching an air distribution method and controller for a fuel cell system.

One of his embodiments is shown in figure 1 which comprises:

- Fuel reforming unit (24) having a fluid inlet (14-2);*
- Hydrogen-cleanup unit (26) having a fluid inlet (14-3);*
- Fluid conduit for providing fuel to the fuel cell (14-4, 14-5);*
- Controller (50).*

The controller communicates with the various MAFs (Mass airflow sensors) to adjust the MFCs (Mass airflow controllers), which the MAF takes a reading based on a timer and the MFC makes adjustments based on the reading [Paragraph 9].

The claimed functionality of the controller is:

- Open the flow valve for a specific fuel cell subsection;*
- 1<sup>st</sup> Sensor associated with the first fluid inlet that regulates the rate of fluid (18-2, 16-2);*

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*2<sup>nd</sup> Sensor associated with the second fluid inlet that regulates the rate of fluid (18-3, 16-3);*

*3<sup>rd</sup> Sensor associated with the third fluid inlet that regulates the rate of fluid (18-4, 16-4);*

*Sensor reading has some form of time constraint in which it measures pressure [Paragraph 24-27], the inlets for the other fuel cell subsections are regulate;*

*Controller is capable of flowing less than 10% the initial volume of fluid compared to the first inlet.*

The controller described in the prior art is capable of performing the claimed functionality. The airflow sensor (16-2) senses the airflow in the tubing (22-2) and the mass airflow controller (18-2) adjusts and controls the airflow that is delivered to the POx reactor (24) [Paragraph 20]. The other fuel cell subsystems have the same capabilities [Paragraph 21]. The sensors take readings periodically (time) [Paragraph 9]. The method of control for the controller is described in Paragraph 25 & Paragraph 26.

In the state when the fuel cell subsystems are turned off, the pressure of the system will be lower than operational pressure. When the system is activated, the pressure of the systems will need to be increased starting with the first inlet. The volume flow of fluid into the first inlet will need to be significantly higher in order get the system operational. The remaining volume flows will be lower because of this. The examiner holds that the controller inherently is capable of performing the last limitation taught by the applicant.

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Kelskula fails to teach a sensor being different than a time based pressure sensor acting as a flow sensor.

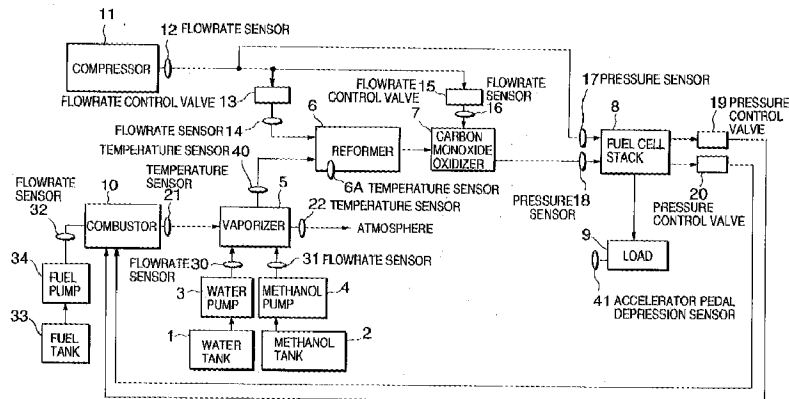


FIG. 1

Okamoto Figure 1

Okamoto teaches a fuel cell stack vaporizer with control method as shown in figure 1. The fuel reformer (6) comprises a sensor and control valve (14, 13); The cleanup unit comprises a sensor and controller (16, 15); The fluid conduit to the fuel cell has a pressure sensor (17) [Figure 1]. The air amount to the reformer is determined based on the detection temperature of the temperature sensor (6A) [Paragraph 35]. The third sensor and controller is controlled by the electric power generated and accelerator depression [Paragraph 37-39]. It would have been obvious for one of ordinary skill in the art to use the teachings of Okamoto to modify Kelskula because Okamoto teaches an efficient fuel processing system that prevents the temperature of the vaporizer of a fuel cell power plant from falling below a temperature [Paragraph 4-13].



***Rejections stated above in view of Okamoto should be applied for this rejection.***

Claim 11 is rejected by the teaching of a fluid flow rate sensor at the first inlet (16-2).

Claim 12 is rejected by the teaching of the fluid being air [Abstract].

Claim 13 is rejected by a compressor (37) that is connected to an inlet of the fuel cell subsystems (14).

Claim 14 is rejected by a connecting pipe (22) that attaches to all subsystems (plenum) and controllable valves that regulate the flow to the subsystems (18).

Claim 16 is rejected by the teaching of the compressor changing the pressure affects the dynamics of the fuel cell subsystems [Paragraph 28].

Claim 17 is rejected by the sensors and controllers (valves) control the rate of input of fluid into the respective subsystems [Paragraph 20-21].

Claim 18 is rejected by a combustor (20) with a fluid inlet (14-1) with a sensor (16-1) and fluid flow controller (18-1) wherein the sensor is in communication with the airflow controller (50) that is in communication with the other subsystems including the fuel reforming unit, the hydrogen-cleanup unit, the fuel cell, and the combustor. This combustor is equivalent to a "tail gas combustor" because of its link to the fuel cell (31) [Paragraph 19].

Claim 19 is rejected by a partial oxidant reformer (POx) (24).

Claim 20 is rejected by the teaching of an air controller for a fuel cell system that requires multiple air inputs. An autothermal reformer is an obvious substitution for the already existing fuel reformer unit and therefore is anticipated by the reference.

Claim 21 is rejected by the teaching of an air controller for a fuel cell system that requires multiple air inputs. A pure steam reformer is an obvious substitution for the already existing fuel reformer unit and therefore is anticipated by the reference.

Claim 22 is rejected by the teaching of an air controller for a fuel cell system that requires multiple air inputs. A water gas shift reactor is an obvious subsystem to the fuel reforming unit but does not require an air input and therefore is not disclosed in this prior art. Although the water gas shift reactor is not pictured here, one of ordinary skill in the art would understand the various subsystems for fuel reforming and would have incorporated it in the system as a whole.

Claim 25 is rejected by the compressor (37) being coupled to the first inlet wherein a compressor is an air pump.

Claim 26: Okamoto teaches the air amount to the reformer is determined based on the detection temperature of the temperature sensor (6A) [Paragraph 35] and a flowrate sensor (14).

Claim 27: Okamoto teaches an air flowrate sensor is taught (16).

Claim 28: Okamoto teaches the third sensor comprises a sensor that monitors the electricity production rate or demand [Paragraph 38-39].

4. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Keskula et al. (PGPUB 2003/0186096) and Okamoto (PGPUB 2002/0182465) as applied to claim 10 above, and further in view of Balasubramanian et al. (US 2003/0031902).

Keskula and Okamoto teaches an controller and control system for delivering a fluid to a multi-component system via one compressor unit and branched distribution means. Keskula fails to teach the fluid being water.

Balasubramanian teaches a controller for controlling the water levels at various multi-component system. It would be obvious for one of ordinary skill in the art to use the controller system of Keskula and Okamoto with the fluid of Balasubramanian because Balasubramanian teaches water systems can lower fuel cell operating temperatures and reduce the amount of needed water to humidify the cathode air.

5. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Keskula et al. (PGPUB 2003/0186096) and Okamoto (PGPUB 2002/0182465) as applied to claim 10 above, and further in view of Beckmann et al (PGPUB 2002/0192517).

Keskula and Okamoto teaches an controller and control system for delivering a fluid to a multi-component system via one compressor unit and branched distribution means. Keskula fails to teach the fluid being fuel.

Beckmann teaches a controller and sensor that opens valves to supply fuel to a fuel cell. The setup of Beckmann teaches a way to greatly reduce the time delay in delivering fuel to various parts and under different conditions [Paragraph 10-15]. It

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would have been obvious for one of ordinary skill in the art to make the known alterations to the setup of Keskula and Okamoto to function with fuel because Beckmann teaches that ability to provide fuel to various parts of the system can satisfy an increase in demand for energy that is put on the system [Paragraph 13].

### ***Response to Arguments***

6. Applicant's arguments with respect to claim 1, 23, 24 have been considered but are moot in view of the new ground(s) of rejection.

In response to the applicant's comment regarding the limitation of "controller regulating...flow volume that is less than about 10% of the average flow volume of the fluid at the first inlet", the applicant must specify how this limitation could not be preformed by the control system of the prior art. The examiner maintains that the control system submitted is capable of performing this same feature.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEPHEN YANCHUK whose telephone number is (571)270-7343. The examiner can normally be reached on Monday through Thursday 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/STEPHEN YANCHUK/

Examiner, Art Unit 1795

/PATRICK RYAN/

Supervisory Patent Examiner, Art Unit 1795